

The Fourier-Kelvin Stellar Interferometer Mission: A Practical Interferometric Mission for Discovering and Studying Extrasolar Giant Planets

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The Fourier-Kelvin Stellar Interferometer (FKSI) is a mission concept for a nulling interferometer for the near-to-mid-infrared spectral region (3–8 μm). FKSI is conceived as a scientific and technological precursor to TPF. The scientific emphasis of the mission is on the evolution of protostellar systems, from just after the collapse of the precursor molecular cloud core, through the formation of the disk surrounding the protostar, the formation of planets in the disk, and eventual dispersal of the disk material. FKSI will answer key questions about extrasolar planets: What are the characteristics of the known extrasolar giant planets? What are the characteristics of the extrasolar zodiacal clouds around nearby stars? Are there giant planets around classes of stars other than those already studied? We present preliminary results of a detailed design study of the FKSI. Using a nulling interferometer configuration, the optical system consists of two 0.5-m telescopes on a 12.5-m boom feeding a Mach-Zender beam combiner with a fiber wavefront error reducer to produce a 0.01% null of the central starlight. With this system, planets around nearby stars can be detected and characterized using a combination of spectral and spatial resolution.

